

fuels specified under paragraph (b) of this section for engine service accumulation. Leaded fuel may not be used during service accumulation.

(2) The octane rating of the gasoline used may not be higher than 4.0 research octane numbers above the minimum recommended by the manufacturer and have a minimum sensitivity of 7.5 octane numbers, where sensitivity is defined as research octane number minus motor octane number.

(d) Other fuels may be used for testing provided:

(1) They are commercially viable,  
 (2) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service,

(3) Use of a fuel listed under paragraph (b) of this section would have a detrimental effect on emissions or durability; and

(4) The Administrator provides written approval of the fuel specifications prior to the start of testing.

**§91.309 Engine intake air temperature measurement.**

(a) Engine intake air temperature measurement must be made within 100 cm of the air-intake of the engine. The measurement location must be either in the supply system or in the air stream entering the engine.

(b) The temperature measurements must be accurate to within  $\pm 2^\circ\text{C}$ .

**§91.310 Engine intake air humidity measurement.**

This section refers to engines which are supplied with intake air other than the ambient air in the test cell (i.e., air which has been pumped directly to the engine air intake system). For engines which use ambient test cell air for the engine intake air, the ambient testcell humidity measurement may be used.

(a) *Humidity conditioned air supply.* Air that has had its absolute humidity altered is considered humidity-conditioned air. For this type of intake air supply, the humidity measurements must be made within the intake air supply system, and after the humidity conditioning has taken place.

(b) *Unconditioned air supply.* Humidity measurements in unconditioned intake air supply must be made in the in-

take air stream entering the engine. Alternatively, the humidity measurements can be measured within the intake air stream entering the supply system.

**§91.311 Test conditions.**

(a) *General requirements.* (1) Ambient temperature levels encountered by the test engine throughout the test sequence may not be less than  $20^\circ\text{C}$  nor more than  $30^\circ\text{C}$ .

(2) Calculate all volumes and volumetric flow rates at standard conditions for temperature and pressure. Use these conditions consistently throughout all calculations. Standard conditions for temperature and pressure are  $25^\circ\text{C}$  and 101.3 kPa.

(b) *Engine test conditions.* Measure the absolute temperature (designated as  $T$  and expressed in Kelvin) of the engine air at the inlet to the engine and the dry atmospheric pressure (designated as  $p_s$  and expressed in kPa). Determine the parameter  $f$  according to the following provisions:

(1) Naturally aspirated and mechanically supercharged engines:

$$f = \frac{99}{p_s} \times \left( \frac{T}{298} \right)^{0.7}$$

(2) Turbocharged engine with or without cooling of inlet air:

$$f = \left( \frac{99}{p_s} \right)^{0.7} \times \left( \frac{T}{298} \right)^{1.5}$$

(3) For a test to be recognized as valid, the parameter  $f$  must be between the limits as shown below:

$$0.96 < f < 1.04$$

**§91.312 Analytical gases.**

(a) The shelf life of a calibration gas may not be exceeded. Record the expiration date stated by the gas supplier for each calibration gas.

(b) *Pure gases.* The required purity of the gases is defined by the contamination limits given in parenthesis. The following gases must be available for operation.